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ABSTRACT

This study looks at the relationship between district wealth and revenues available for education in Illinois using a "conditional" conception of wealth neutrality that holds constant the operational tax rate. Data used were demographic data of Illinois school districts. An analysis of beta weights suggested an undesirable relationship between wealth and expenditures in elementary and high school districts. Also, when Illinois districts are examined using the conditional equity approach, it was revealed that in the years 1976-1979, all types of districts actually retreated from a notion of equity. The data suggest that when using only the simple neutrality model, some of the relationship between wealth and expenditures is hidden. Specifically, in elementary districts the conditional model shows continued movement away from equity since 1973-74 and the simple model shows movement toward equity in 1976-77 and away from equity in 1978-79. (Author/JM)

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CONDITIONAL WEALTH NEUTRALITY AS A SCHOOL FINANCE EQUITY CRITERION IN ILLINOIS

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I. Background

In the summer of 1973 the Illinois General Assembly made a major change in the grant-in-aid system for the support of K-12 education. After many decades of experience in Illinois with a "foundation level" grant-in-aid system, the Legislature adopted what is variously called elsewhere in the nation a "guaranteed tax yield" or "guaranteed valuation" system.(1) In Illinois this was known as the "resource equalizer" system. An essential feature of the system was that, all other things remaining equal, a local school system would be rewarded for an increase in tax rate (up to certain ceilings imposed by the state) by an increase in general purpose state aid. A local school district which was successful in passing referenda to increase local operating tax rates could therefore expect, not only increased local revenues, but also increased state revenues, upon success in the voting booths. This "stimulation" or "reward for local effort" aspect of the Illinois grant-in-aid system remained in place until the summer of 1979, when the Legislature ended the six-year Illinois experience with "reward for effort" by passing an amendment to the basic 1973 law which will phase out the "reward for effort"

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provision over a period of three years.(2) During this six-year period of time the funding system was modified by two sets of amendments, one set in 1976 and a second set in 1978. The details of the 1973 law, the subsequent 1976 and 1978 amendments, and the arguments "for" and "against" the "reward for effort" system, have been described in some detail in other publications of the Center for the Study of Educational Finance.(3) Brief descriptive materials are found in Appendix A of this study.

After the passage of the 1973 legislation, the Illinois School Problems Commission assumed the burden of monitoring the effects of that legislation relative to general equity goals and relative to the impact of that legislation upon the equalization of educational opportunity. The Commission contracted with the Center at Illinois State University to conduct a series of studies which would indicate whether the state was moving toward those equity goals or moving away from those equity goals. The Center then developed essentially two sets of equity measurements. One set of equity measurements focuses upon revenue disparities between school districts; that is, the variation between districts in expenditure or revenue per pupil. A second set of measures focuses upon the relationship between local district wealth and the revenues to support education; that is, the association between district wealth and district revenues.(4) Four evaluations were conducted for the

Illinois School Problems Commission using these techniques, and the reader is referred to those volumes for the details of the evaluation procedures.(5) This study is the fifth in the Center's "monitoring" series conducted for the Illinois School Problems Commission.

The first three of these evaluations were essentially optimistic in that they showed Illinois to be moving toward the accomplishment of equity goals. However, the fourth study is much more pessimistic, and we quote from the study itself:

> Subject to the limitations noted elsewhere in this report, the general finding seems clear. For four years the basic legislation passed in 1973 and the substantial increase in state aid necessary to fund that "reform" were successful in moving Illinois toward the goal of less expenditure disparity between school districts and greater wealth neutrality. However, in the last two years a reversal has taken place. This reversal has caused all the gains to be lost with regard to expenditure disparity in unit districts and elementary districts, and some of the gains to be lost with regard to wealth neutrality. The fact that the reversals did not occur until 1976-77 strongly suggests that the amendments to the 1973 legislation, rather than the basic 1973 legislation itself, are to blame for these reversals.(6)

If the "school finance reform" movement has truly collapsed in Illinois, this is a very serious state of affairs, and we wish to be doubly sure that our evaluation procedures validly reflect this poor state of the patient's health.(7) We have therefore undertaken another time series analysis on Illinois school finance data in this study, with some-

what different evaluation techniques, to validate our earlier published findings on school finance equity in Illinois.

This study will focus solely upon the associational aspects of the equity problem; that is, the relationship between district wealth and revenues available for education. In both professional literature and court decisions this is often referred to as either "fiscal neutrality" or "wealth neutrality." The desired state of affairs is one in which district revenues are not a function of, that is to say, they are not determined by, the wealth of the district. Much of the professional literature and at least some of the court decisions have held that the quality of a child's education is too important to that child's life chances, and to the child's constitutional rights, to be determined solely by the wealth or lack of wealth of the school district in which he or she resides.(8) The concept of "wealth neutrality," however, is not so simple. One can distinguish between "simple" or "unconditional" wealth neutrality on the one hand, and "conditional" wealth neutrality on the other hand.

As Friedman and Wiseman point out(9), many "authorities" expect and even encourage revenue differences in expenditure levels among school districts if these districts have student populations with different characteristics. Unfortunately, there is little agreement as to which of

these "exceptional characteristics" are considered a legitimate source of revenue variation, and which are not considered a legitimate source of revenue variation. Generally speaking, the professional literature encourages districts to vary their spending according to different educational "needs" of students, and there is also the expectation that district revenues will vary according to differences in geographic cost-of-living factors.(10) Beyond the umbrella-like "needs" concept and the specific cost-of-living matter, there is little consensus. Johns and Mager have pointed out that if a state officially recognizes the principle of "reward for effort," as the state of Illinois did for at least six years, then the evaluation procedures for equity should take this into consideration.(11) We tend to agree with Johns and Mager, and have therefore conducted this longitudinal study of Illinois with a notion of "conditional" wealth neutrality in mind. Specifically, in this study we shall hold constant the operational tax rate, and then observe the relationship between district wealth and district revenues. It should be stressed that this is a very limited definition of "conditional wealth neutrality." Models used by Garms hold constant more than just tax rate when observing the relationship between district wealth and district revenue.(12) In fact, examination of the older literature on the "determinants of local educational spending" would suggest a whole host of variables that could be

held constant when observing the relationship between wealth and district revenues.(13) However, the important policy point is that there must be some consensus that these variables which are being held constant are legitimate sources of revenue disparity. In Illinois, for six years, it was agreed that revenues should vary according to local tax effort, and therefore it can be argued that that source of revenue variation should be partialed out before one looks at the revenue variation caused by wealth variations between districts. Recent work by McMahon would enable one to further partial out the effects of geographic cost-of-living differences, although that has not been done in this study and constitutes a limitation on the findings.(14) The "needs" problem is much more complex. A small part of the "needs" aspect is taken into consideration in this, and other Illinois studies by the Center, in that the pupil measurement used is average daily membership weighted by the concentration of title one eligibles in the district. This weighted student in Illinois thus reflects different district needs for compensatory educational services. However, there is no overall way of getting at different district "needs" in this state--and very few other states. This also constitutes a limitation on the study.

The specific research questions addressed in this study were:

1. While controlling for the one "exceptional characteristic," operating tax rate (OTR),

what is the magnitude of the remaining variation in expenditures per pupil that can be associated with the wealth of the district?

2. What has been the pattern of movement through time of the relationship between wealth and expenditures since the institution of the 1973 reform and subsequent amendments to that reform?

3. Do the conclusions with regard to wealth neutrality differ using the "simple" model as opposed to using this "conditional" model of wealth neutrality?

The basic purpose of the research was to explore these three major areas. Secondarily, the influence of methodological factors on the results was also examined, and much of this is set forth in the appendices to this report.

II. Operational Questions

In designing the research, one immediate area of concern was the selection of appropriate variables. There are also idiosyncracies within the Illinois system which mandated special treatment in this project. Basically, there are three variables that need to be defined: (1) wealth, (2) expenditures, and (3) exceptional characteristics.

Traditionally, wealth has been measured using the assessed valuation (ASVL) of property within a district. In the present research, the "wealth" variable will likewise be operationally defined in the traditional mode. Practically speaking, the local revenue for schools comes from the aforementioned property assessments; further, the use of

assessed valuation provides a somewhat up-to-date tool to be used in any neutrality study. There are proponents of the use of an income measure for the wealth variable, and McMahon has made a very strong case for a broader measure of both wealth and effort in Illinois.(15) In Illinois, unlike a number of other states, this is difficult in that the only income data are derived from federal census and therefore become quickly out of date.(16)

The Center's previous publications do provide some equity analysis in terms of district income, and important new equity studies conducted in five states by Stephen J. Carroll were also conducted in terms of district income.(17) Although it appears that further equity research with income as the wealth variable is certainly needed, the present research operationally defines wealth in terms of the assessed valuation of a district.

The next operational question concerns the measure chosen for the expenditure variable. In operationally defining an expenditure, one must assume that the revenues a district receives are directly or indirectly funneled to the student; further, it must be assumed that the funneling occurs in a similar manner from district to district. This, in and of itself, would probably provide an exhaustive research topic. Let the assumption suffice for the time being. It must also be noted that the expenditures found in this research include only those revenues obtained

through a local tax levy and revenues obtained through the general state aid formula. Both state and federal categorical monies are excluded from the data. The wealth neutrality literature speaks of the relation of expenditures and wealth and we have followed that practice here. However, the data we are using in this and all previous Center evaluations are not audited expenditures but estimated revenues.

In Illinois, there is an important question concerning the unit of measurement over which the revenues and assessed valuation are to be distributed. For instance, one can have $100,000 divided in terms of an actual pupil count (ADA) of one hundred so that there is a revenue (expenditure) per pupil of $1,000. As noted previously, in Illinois an "exceptional characteristic" has been built directly into the funding formulas. Illinois uses title one eligibility as an "exceptional characteristic," and has incorporated it directly in the system using a concentration notion. So while a district may have one hundred "actual" students, they may all qualify in terms of title one requirements for low income groups. Under the funding system used during this study period, each one of those children would be equal to a share of 1.675 times the "normal" child's share. In reality then, if the title one weighted basis is used, the revenue measure would be the same $100,000 divided by 1,675 title one weighted average daily attendance (TWADA). So in the statistical analysis, the calculation would be examining

a unit of 597 dollars in this method as opposed to one thousand dollars in the first example. What this means is that for an "equal" education, more money must somehow be allocated to these high concentration areas of title one students, and this is what the Illinois system has done by raising the 597 dollars to 1,000 dollars per TWADA.

Ethical, political, and economical debate still surrounds the parameters of this particular "needs" construct, but the principle is widely accepted in Illinois. Rather than make the title one monies a categorical kind of funding, the Legislature chose to include it as a part of the general funding systems, and this study will do likewise. While we are not controlling for TWADA in the sense that we are controlling for OTR, this "special characteristic" is controlled for within the process by using both assessed valuation per title one weighted average daily attendance (ASVLTWA) and revenue per title one weighted average daily attendance (REVTWADA) as our independent and dependent variables respectively.

Having established ASVLTWA as the independent variable and REVTWADA as the dependent variable, the controlling variable (effort) is then defined in terms of the operating tax rate (OTR) within a given district. The OTR is that one "exceptional characteristic" that the present research controls, thereby establishing the "condition" within the "conditional" wealth neutrality model.

It should be noted at this juncture that Illinois has three types of districts: (1) elementary (K-8), (2) high school (9-12), and (3) unit (K-12). This fact makes any research a three-fold proposition. Even though the unit districts contain approximately 65 percent of all public school children, the elementary and high school districts continue to play a major political part in Illinois school finance.

III. Findings

Perhaps the first step toward understanding the existence or nonexistence of equity in Illinois is to examine the proportions of districts and students that are presently funded using the "resource equalizer" formula. The results are presented in Table 1.

While three out of four districts in Illinois are funded under the resource equalizer formula, they contain over 90 percent of the students. The remaining districts and pupils are funded under one of three alternate methods--the one which will provide them with maximal revenues. Districts, therefore, have vacillated from one allocation method to another, depending on what method would be most beneficial financially.

Table 2 also represents proportions of districts and pupils funded under the resource equalizer method, and it

further represents any alterations in these percentages over the years included in the present research. In 1978-79, over 90 percent of the pupils in Illinois were funded under the resource equalizer formula. However, the percentage funded by the resource equalizer method in 1976-77 was greater yet. While at one point in time the trend was movement toward greater participation in the resource equalizer method, the trend seems to have reversed so that districts once funded under the resource equalizer method are actually reverting to one of the alternate methods.

The alternate methods, however, do not have as much "equalizing power" built into them as the resource equalizer formula does. Obviously, there will be some variance in revenues. The present research question deals with the significance of that variance. This is not to suggest that all variance in revenues is due to the method of allocation under which a district is functioning. However, a percentage of the variance is a function of the allocation method. Where other sources of variance appear, it will be noted.

The next portion of this paper will address itself specifically to the research questions. Methodological questions are dealt with extensively in the Appendices, but are also discussed in the following portions where such a discussion is relevant to the question at hand.

In examining the first research question, a review of the question itself and the variables contained within is in order.

QUESTION #1: While controlling for the "exceptional characteristic," OTR, what is the magnitude of the remaining variation in expenditures per pupil that can be associated with the wealth of the district?

where: Exceptional characteristic = operating tax rate (OTR)

Wealth = assessed valuation per title one weighted pupil (ASVLTWA)

Expenditure = revenues (state & local) per title one weighted pupil (REVTWADA)

Essentially, the procedure is to ferret out variability in expenditures related to OTR, an acceptable cause (effort) for variance, and then examine the extent to which the remaining variability in expenditures is related to wealth, an unacceptable cause for variance. Note that for ease in comparison with previous Illinois finance research, log-10 transformations have been made on all variables.

The analysis of the data used the multiple regression analysis technique, which simply attempts to identify the strength of the relationship between one variable and any number of other variables. In the present research, the interest is in the strength or magnitude of the relationship between the criterion variable of REVTWADA and the independ-

ent variable ASVLTWA. In theory, the operating tax rate is the one variable that will be "allowed" to demonstrate a positive relationship to REVTWADA while still adhering to a wealth neutrality concept. This is in compliance with the "reward for effort" notion. Using the multiple regression concept and controlling for OTR, any remaining variation demonstrated is an indicator of the attainment of a "conditional" wealth neutrality status; i.e., the smaller the relationship, the closer it is to neutrality. Again, for ease of comparability with previous studies, the present research used the beta weightings as the primary method of reporting the relationships. Table 3 presents the observed relationship between both OTR and ASVLTWA with REVTWADA for the school year 1978-79.

When examining beta weights, the larger the value, the larger the existing relationship. As can be seen, the weights obtained for the wealth measure (ASVLTWA) are somewhat larger than those of the effort (OTR) measure in both elementary and high school districts. In terms of our equity goals, these figures leave something to be desired, particularly in high school and elementary districts. The desired goal is to demonstrate no relationship between wealth and expenditures. The beta weights point out that the unwanted relationship (wealth and expenditures) is actually greater than the wanted relationship (effort and expenditures) in elementary and high school districts;

further, the beta for ASVLTWA of unit districts is sufficiently large to cause some concern. From the perspective of the R^2 change notion discussed in Appendix E, it can be said that 59 percent of the variation in expenditures found among elementary districts can be attributed to variations found in the wealth of those districts. Although the percentage was not as high for the other types of districts, a strong relationship is still found. Note, however, that the weights are based on the district as the unit of analysis. With the pupil as the unit of analysis, i.e., the weighted regression approach discussed in Appendix C, the relationship is weaker for all types of districts.

Even with a very obvious relationship between wealth and expenditures demonstrated at the present time, it is inadvisable to draw any conclusions concerning the foregoing relationship without first examining the relative standing of equity at present with measure over time. This leads to the second research question which carries more import in terms of the relationship between Illinois legislation and "unconditional" wealth neutrality in Illinois school finance.

QUESTION #2: What has been the pattern of movement of the relationship between wealth and expenditures since the institution of the 1973 reform and subsequent amendments to the reform?

The question, simply stated, becomes, "Is Illinois doing better or worse in its achievement of equity?" To gain an historical perspective of the equity movement, data

from the school years 1973-74, 1976-77, and 1978-79 are used. The 1973-74 data give a picture of the state of equity immediately following the institution of the resource equalizer formula. The 1976-77 and 1978-79 data give a picture immediately following years in which major amendments to the formula were passed in the General Assembly. It would not be appropriate to use 1972-73 as a base year, such as has been done in other Center studies, since the state did not officially recognize "reward for effort" in 1972-73.

By examining Table 4, the reader can follow any changes in the relationships between wealth and expenditures that occurred from 1973 to 1979.

Upon examination of the movement between the first two points in time, the relationship between wealth and expenditures has been found to decrease in magnitude in both unit and high school districts. However, the relationship for elementary districts increases in strength. In a similar comparison of the last two points in time, the relationship between wealth and expenditures increases in strength for all types of districts. In the past three years, all types of districts have actually retreated from a notion of equity using this "conditional" equity approach.

If the six-year span is examined, only the unit districts seem to have made "significant" progress toward a state of equity; further, even that progress is beginning to demonstrate signs of erosion. In fact, by using the

"residual R^2" approach discussed in Appendix F as a method of analysis, the strength of the relationship between wealth and expenditures in 1978-79 was greater than that of 1973-74 for each type of district.

Possible explanations for this phenomenon generally center around the 1976 and 1978 legislative amendments to the funding formulas. Amendments in these years could be classified as both political and economical necessities. Liberal "add-on" policies for the alternate formula districts, as well as a three-year averaging provision to financially protect schools with declining enrollments, may have contributed to the movement from equity. Whatever the reasons, it would seem apparent that with the reversal in trends, the time has come for educators and legislators alike to reexamine the ethical, economical, and judicial implications of such a movement away from a goal of wealth neutrality.

As mentioned previously, over 90 percent of the pupils in Illinois are funded under the resource equalizer formula. Some have argued, therefore, that the main thrust of equity analysis should be directed toward this large majority of the school population. Indeed, if "conditional" wealth neutrality is examined using only those districts receiving allocations through the resource equalizer formula, an approximation of equity seems to be nearer at hand. Table 5 represents the movement of equity of only those districts funded through the resource equalizer formula.

In both the unit and elementary districts, the relationship between wealth and expenditures is virtually nonexistent by 1978-79. Even though most high school districts are funded under the resource equalizer formula, there are parameter idiosyncracies with these districts that cause special problems. An explanation of these problems is found in Appendix B. However, when examining only those districts on the "theory perfect" or resource equalizer system, equity has all but been attained, except in the high school districts. Once again, it is necessary to remind the reader that the perfect theory does little to dissolve the economical and political realities that contribute to the establishment and maintenance of the alternate methods within the state of Illinois. However, it is helpful to examine separately those districts of "equity intent" and those of "political reality."

Even though the argument that over 90 percent of the pupils are funded through the "theory perfect" system and that they do indeed approach equity is valid, it should be remembered that the continued changes in the funding systems have probably caused a number of districts to switch back to the now more lucrative alternate methods. These changes are sure to have contributed to the overall erosion of equity movement demonstrated in the present research.

The preceding findings concerning equity movement in Illinois are not surprising in light of previous research

in this area. With the previous research using the "simple" wealth neutrality approach and the present research using the "conditional" wealth neutrality approach, there is now a basis for comparison of the two theoretical approaches.

QUESTION #3: Do the conclusions with regard to wealth neutrality differ using the "simple" model as opposed to the "conditional" model?

Table 6 demonstrates that in terms of conclusions relating to the movement of equity through time in Illinois, very little difference occurs using the "conditional" approach as opposed to the "simple" approach. The one exception occurs for elementary districts: the "conditional" model shows continued movement away from equity since 1973-74; the "simple" model shows movement toward equity in 1976-77 and away from equity in 1978-79. However, if the magnitude of the relationship between wealth and expenditures is examined using the beta weights, it is clear that the "simple" neutrality demonstrates considerably smaller relationships than does the "conditional" neutrality model.

It is important to reiterate that the "simple" model does not control for effort (OTR) while the "conditional" model does. If the data are examined, the relationship between OTR and ASVLTWA is found to be negative. Although the correlation coefficients are somewhat moderate at best (-.28 to -.38), the data suggest that in using only the "simple" neutrality model, some of the relationship between wealth and expenditures is hidden. That is, the resulting

revenues appear to be more homogeneous than would be the case if effort were not a factor, since those districts with high assessed valuations tend to tax at a lower rate and those with low assessed valuations tend to tax at a higher rate.

So while the "unconditional" approach leads to similar conclusions regarding movement of equity, it appears necessary, especially in those states such as Michigan, Ohio, Colorado, and others that officially recognize "reward for effort," to examine the relationships with a "conditional" model as well as a "simple" model to further delineate equity status. This empirical study thus supports the Johns and Magers position that there should be a "system of analyzing state and local revenues in terms of yield for effort." However, since the findings for Illinois in terms of "conditional" wealth neutrality are not greatly different through time than the findings for "simple" wealth neutrality, we believe Johns and Magers' contention that "simple" wealth neutrality studies lead to "invalid and misleading conclusions" is a bit of an overstatement.(18)

IV. Conclusions and Implications

A number of conclusions can be drawn from the foregoing research. Although the majority of the conclusions do not differ significantly from previous research in this area, using a "simple" wealth neutrality model, the use of the "conditional" model further delineates the school finance

equity condition in Illinois. The first three areas deal specifically with the research questions outlined in the text, while the last portion deals generally with methodological conclusions and implications gleaned from those areas as discussed in the Appendices.

1. In analyzing just the data from the 1978-79 school year, two general conclusions can be drawn:

A. When all districts are included in the analyses, regardless of the allocation method, only unit districts could be said to be in a position approximating wealth neutrality. Even this, at best, could only be classified as a very distant approximation. In all types of districts, the wealth of the district in Illinois renders a greater effect on what a district spends than does the effort of the taxpayers of the school community.

B. If only resource equalizer districts are analyzed, the equity situation is somewhat different. In both elementary and unit districts, the data suggest that these districts are very close to achieving wealth neutrality. Since those elementary and unit districts that are funded under the resource equalizer contain 79 percent of all pupils in the public sector in Illinois, it could be loosely interpreted that four out of five students are "equitably" funded. This is a loose interpretation because, in reality, if even only 20 percent of the population receive

greater funding because of their wealth, it is difficult to sit silently simply because of the equity of the other 80 percent.

2. In examining equity movements over time, the amendments to the 1973 reform in 1976 and 1978 have diminished the wealth neutrality effects of the 1973 reform to the point that the state is regressing from the "desired" goal. These amendments, while increasing support to all school districts, were also designed to assist the alternate formula districts to gain more state aid. With over 90 percent of the pupils in the state of Illinois receiving their state allocation through the resource equalizer formula, decisions were made to succor that approximate 10 percent of the students who, by means of the wealth surrounding them, have not had to make as great a community effort, and yet continue to have spending per pupil to an extent that makes the total system unequal. Not only have the amendments assisted those funded through an alternate formula, they have also made the alternate formulas alluring to the point that districts once on the resource equalizer formula are beginning to switch to an alternate formula. This should not be understood to suggest that additional aid has not been supplied to all districts, but rather that the additional aid going to the non-resource equalizer districts has adversely affected the equity index.

While moving closer to wealth neutrality seems difficult due to the large variance of wealth between school districts and unavoidable state revenue fiscal restraints, a move away from a goal of wealth neutrality is possible and seems evident at the present time. Before any further movement from this equity goal, it is suggested that a further examination of priorities is needed. If the Illinois courts ever hold that expenditures should not be a function of local wealth, as state courts have held in other states, it would be difficult to show that recent actions of the Illinois Legislature are designed to accomplish that fiscal goal.

3. The "simple" wealth neutrality model appears to conceal some of the relationship between wealth and expenditures. Relative values of equity using the "conditional" model exceeded those of the "simple" model, i.e., under the "conditional" model, districts appear to be further away from wealth neutrality. The reason for this is that districts of high wealth tend to exert less effort, which clouds the analysis of the expenditure variable. The "simple" model alone is not able to detect this.

As long as one is looking only at movement through time strictly in terms of direction, the "simple" model will suffice. If, however, a quantitative aspect is introduced, i.e., "how much is too much," the "conditional" model seems to be more appropriate.

4. Specific conclusions regarding methodological questions relating to "conditional" wealth neutrality can be found in the Appendices. The present research used a number of alternate procedures to the one as reported in the body of this paper. While each of these analyses led to similar policy conclusions through time, each provided a different perspective of the complexities associated with the notion of equity in public school finance.

The analysis contained in Appendix C, where districts are weighted by the number of pupils in each district, adds an important new dimension to the Center's equity monitoring series of evaluations. As can be seen from Table 7, when districts are weighted by pupils, there has been less retreat from the goal of wealth neutrality than when the district is the unit of analysis. But even in this type of analysis, there is little evidence that Illinois is moving toward the goal of wealth neutrality in recent years.

5. The analysis contained in Appendices B and F should also alert policy makers to the number of districts operating "outside" the equalization formula, e.g., above the tax rate and wealth parameters in the formula. As this number of districts increases, the state will move further from the goal of wealth neutrality.

TABLE 1

DEMOGRAPHIC DATA OF ILLINOIS SCHOOL DISTRICTS FOR THE SCHOOL YEAR 1978-1979

Type of District	Total # of Districts	Total # of Pupils	Percent Districts On Resource Equalizer	Percent Pupils On Resource Equalizer
ELEMENTARY	439	474,604	72	82
HIGH SCHOOL	126	322,190	90	95
UNIT	448	1,505,266	76	95
TOTAL	1,013	2,302,060	76	92

TABLE 2

PERCENTAGES OF ILLINOIS DISTRICTS AND PUPILS FUNDED UNDER RESOURCE EQUALIZER FORMULA

Type of District		1973-74 %	1976-77 %	1978-79 %
ELEMENTARY	District	71	79	72
	Pupil	88	89	82
HIGH SCHOOL	District	94	96	90
	Pupil	98	98	95
UNIT	District	45	85	76
	Pupil	83	97	95
TOTAL	District	64	84	76
	Pupil	86	95	92

TABLE 3

1978-79 RELATIONSHIPS OF OTR
AND ASVLTWA WITH REVTWADA--LOG-10
TRANSFORMATIONS: DISTRICT AS THE UNIT OF ANALYSIS

Type of District	Beta Weight*	
	OTR	ASVLTWA
ELEMENTARY	.51958	.80140
HIGH SCHOOL	.64551	.74182
UNIT	.73216	.49554

*The beta weights are derived from the two-variable model--OTR and ASVLTWA as independent variables.

TABLE 4

RELATIONSHIP OF ASVLTWA AND
REVTWADA WHILE CONTROLLING FOR OTR--LOG-10
TRANSFORMATIONS: DISTRICT AS THE UNIT OF ANALYSIS

Type of District	Beta weights* for ASVLTWA		
	1973-74	1976-77	1978-79
ELEMENTARY	.65235	.67987	.80140
HIGH SCHOOL	.86058	.68197	.74182
UNIT	.77533	.37668	.49554

*The beta weights are derived from the two-variable model--OTR and ASVLTWA as independent variables.

TABLE 5

RELATIONSHIP OF ASVLTWA AND REVTWADA WHILE CONTROLLING FOR OTR--LOG-10 TRANSFORMATIONS: DISTRICT AS THE UNIT OF ANALYSIS RESOURCE EQUALIZER DISTRICTS ONLY

Type of District	Beta Weights* for ASVLTWA 1973-74	1976-77	1978-79
ELEMENTARY	.28835	.05007	.06628
HIGH SCHOOL	.66699	.50808	.38004
UNIT	.63098	.06227	.01275

*The beta weights are derived from the two-variable model--OTR and ASVLTWA as independent variables.

TABLE 6

COMPARISON OF "SIMPLE" AND "CONDITIONAL" MODELS IN DETERMINING RELATIONSHIP BETWEEN ASVLTWA AND REVTWADA--LOG-10 TRANSFORMATIONS: DISTRICT AS THE UNIT OF ANALYSIS

Type of District	Model	Beta Weights* 1973-74	1976-77	1978-79
ELEMENTARY	Simple	.24592	.18782	.25807
	Conditional*	.65235	.67987	.80140
HIGH SCHOOL	Simple	.39949	.22161	.23793
	Conditional*	.86058	.68197	.74182
UNIT	Simple	.17640	.03544	.11687
	Conditional*	.77533	.37668	.49554

*The beta weights are derived from the two-variable model--OTR and ASVLTWA as independent variables.

Notes and References

1. For a classification of all fifty states in the Union in terms of "foundation" programs, "guaranteed tax yield" programs and combinations of these two systems, see Kent McGuire, John Augenblick, and Jennie Espinosa, School Finance at a Fourth Glance, 1979, Education Finance Center, Education Commission of the States, Denver, Colorado

2. Senate Bill 1172-81st General Assembly of Illinois, 1979

3. See especially the following Center publications: G. Alan Hickrod, Ben C. Hubbard, and Thomas W. C. Yang, The 1973 Reform of the Illinois General Purpose Educational Grant-in-Aid: A Description and an Evaluation, 1974, (also available in Esther O. Tron (ed.), Selected Papers in School Finance, 1975, 1974, USOE, Government Printing Office, Washington, D.C. and as ED 127 681 in the ERIC service): G. Alan Hickrod, Thomas W. C. Yang, Ben C. Hubbard, and Ramesh Chaudhari, Measurable Objectives for School Finance Reform, 1975, (also available as ED 103 977 in the ERIC service); G. Alan Hickrod, Ben C. Hubbard, Thomas W. C. Yang, Tharin Rasanond, and Ramesh Chaudhari, The 1973 Reform of the Illinois Grant-in-Aid: An Evaluation After Three Years, (also available as TM 006 099 in the ERIC service); G. Alan Hickrod, Ramesh Chaudhari, and Ben C. Hubbard, Equity Goals in Illinois School Finance: 1973-1979, 1979, Center for the Study of Educational Finance, De Garmo Hall, Illinois State University, 61761. Detailed arguments for and against the "reward for effort" system are found in: G. Alan Hickrod, Ramesh Chaudhari, and Ben C. Hubbard, Reward for Effort in Illinois School Finance, 1978, the Center, Illinois State University.

4. For an early statement of these evaluation procedures see: G. Alan Hickrod, Ramesh B. Chaudhari, and Tse-Hao Tcheng, Definition, Measurement, and Application of the Concept of Equalization in School Finance, 1972,

Illinois Office of Education (available as Ed 078 551 in the ERIC service). See also, Measurable Objectives for School Finance Reform, 1975, op.cit. The most comprehensive recent statement of these evaluation techniques is Robert Berne and Leanna Stiefel, A Methodological Assessment of Education Equality and Wealth Neutrality Measures, 1978, Education Finance Center, Education Commission of the States, 1860 Lincoln Street, Denver, Colorado, 80295. Further elaboration may be found in Allan Odden, Robert Berne, and Leanna Stiefel, Equity in School Finance (forthcoming), Education Finance Center, Denver, Colorado

5. See footnote #3; all of these publications are available from: The Center for the Study of Educational Finance, De Garmo Hall, Illinois State University, Normal, Illinois, 61761

6. P. 14, Equity Goals in Illinois School Finance: 1973-1979, 1979, the Center.

7. If the "school finance reform" movement is in trouble in Illinois, it might take some lessons from a recent paper by Charles Benson on building more viable political coalitions. See: "What's Fair in School Finance?", 1979, School of Education, Berkeley, California. See also James A. Kelly, School Finance: The Rising Tide of Reform, 1978, Ford Foundation, New York: New York.

8. For brief summaries of the many constitutional challenges to state grant-in-aid systems based partially on the notion of "wealth neutrality," see: David C. Long, Richard S. Kohn, and Joel D. Sherman, Summary of State-Wide School Finance Cases Since 1973, 1977, Lawyers Committee on Civil Rights Under Law, Washington, D.C.; Betsy Levin, State School Finance Reform: Court Mandate or Legislative Action?, 1977, National Conference of State Legislatures, Washington, D.C.; David C. Long, Richard S. Kohn, and Joel D. Sherman, Update on State-Wide School Finance Cases, 1978, Lawyers Committee, Washington, D.C.

9. Friedman, Lee S., and Michael Wiseman, "Understanding the Equity Consequences of School Finance Reform," Harvard Education Review, May, 1978

10. For literature on educational needs, consult any of the publications of the National Educational Finance Project, especially: Roe L. Johns, Kern Alexander, and Richard Rossmiller, Dimensions of Educational Need, 1969, Institute for Educational Finance, University of

Florida, Gainesville, Florida; also Roe L. Johns, Kern Alexander, and K. Forbis Jordan, Financing Education: Fiscal and Legal Alternatives, 1972, Merrill Publishing, Columbus, Ohio; William P. McLure, "Measures of Educational Need," in Carol Hanes, (ed.), Perspectives on Illinois School Finance, 1977, Illinois Office of Education, Springfield, Illinois. For literature on cost-of-living geographic adjustments, see Walter W. McMahon and Carrol, Melton, "A Cost-of-Living Index for Illinois Counties and School Districts," in Hanes, op.cit.; Esther O. Tron, Selected Papers in School Finance, 1975, USOE, Government Printing Office, Washington, D.C.; Jay G. Chambers, Allan Odden and Phillip E. Vincent, Cost-of-Education Indices Among School Districts, 1976, Education Finance Center, Education Commission of the States, Denver, Colorado. These matters are also discussed in any good school finance text, and especially recommended are: Charles S. Benson, The Economics of Education, Third Edition, 1978, Houghton-Mifflin; and, Walter I. Garms, James W. Guthrie and Lawrence C. Pierce, School Finance: The Economics and Politics of Public Education, 1978, Prentice-Hall, Englewood Cliffs, New Jersey.

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APPENDIX A

THE 1973 ILLINOIS LAW AND 1976 AND 1978 AMENDMENTS

The 1973 Reform

As the law passed in 1973 nothing was done to the taxing power of districts except the enactment of a roll-back for high taxing districts, which affected ability to tax in a few high tax districts. Even this change was repealed in 1976. Any inequities that existed (for example, the taxing power of high school districts which gave them local dollars rather than state aid was not changed, despite the new law giving them access to state dollars at the same rates as other districts which did not have adequate local taxing power) and all referendum requirements were left as they existed. It is fair to say that only the common school fund section of Article 18, Section 8 of the School Code of Illinois was amended. The taxing power of school districts and the referendum restriction on that taxing power found in Article 17 was in no way altered.

A new concept known as the "resource equalizer" was enacted, which became a fourth optional formula for districts. It included a provision for districts taxing at a

high level to roll back the tax rate as the state aid went up. If a previously enacted formula with a slight increase that was included (19 percent add-on was increased to 25 percent) produced more revenue than the new formula, the district could, and still may, choose the state aid option that produces the most money. The four optional formulas that districts could choose from in 1973-74 were:

(1) Foundation Formula

$$G = TWADA \times F - (T_{(1)} \times AV) + 25\%$$

(2) Alternate Method

$$G = \left(\frac{X}{AV/TWADA}\right) \times \$120 + 25\%$$

(3) Flat Grant

$$G = TWADA \times \$48 + 25\%$$

(4) Resource Equalizer

$$G = TWADA_{(c)} \times T_{(2)} \times (AV_g - AV_i)$$

where:

(a) G = state grant

(b) $WADA$ = ADA weighted 1.25 for high schools and .5 for kindergarten

(c) $TWADA$ = (District Title I Eligibles x .45) + WADA

(d) $$TWADA_{(c)} = WADA + TI_1 \times \frac{\frac{TI_i}{WADA_i}}{\frac{TI_s}{WADA_s}} \times .375 \text{ not to exceed } .75$$

where:

TI = Title I count

i = individual district

s = state

(e) F = foundation level

(f) $T_{(1)}$ = qualifying operating tax rates: $1.08/$100 assessment for K-12 districts; $.90/$100 assessment for dual districts with less than 100 WADA; $.84/$100 assessment for dual districts with 100 or more WADA

(g) $T_{(2)}$ = district tax rate for operating purposes not to exceed .03 for K-12 districts, .0195 for K-8 districts, and .0105 for 9-12 districts

(h) AV_g = guaranteed assessed valuation per $TWADA_c$ for districts: $42,000 for K-12; $64,615 for K-8; $120,000 for 9-12

(i) AV_i = assessed per $TWADA_{(c)}$ in individual district

(j) X = a constant set at 47.619 for dual districts with 100 or more TWADA, 44.444 for dual districts with less than 100 TWADA, and 37.037 for unit districts

The 1976 Amendments to the General State Aid Formula Which Became PA 79-1

These amendments changed the claims of many districts, but since appropriations were not increased to cover the

added cost--proration in fact reduced what some districts would have gotten--the bill simply shifted the incident of the receipt of state dollars. PA 79-1 changed a provision of the law that allowed a district to claim payment either on the current year or the previous year's WADA to the current year or the average of the three previous years. This was in response to declining enrollments in many districts. The bill also authorized an increase in the guaranteed assessment levels for K-12 districts to $43,500 and increased the guaranteed assessment level for K-8 districts to $66,300. The maximum tax rate which the state would match was reduced to 2.9 percent for K-12 districts and 1.9 percent for K-8 districts. The bill further authorized counting the taxes collected for transportation as operational and for one year saved harmless all districts from decreasing their prorated state payment because of these changes. PA 79-1 increased the total cost of the formula about $100,000,000 and thus caused at least one additional year before the full calculated and authorized claims could be paid, since appropriations were not increased enough to cover this additional cost. In addition, this amendment repealed the rollback provision of the original act so that the full taxing power granted under Article 17 remains in effect.

These amendments allowed districts willing to tax at very high rates to continue to levy these high taxes as

they achieved full funding from the state. They reduced the part of most district tax rates that were necessary to qualify for state aid and guaranteed higher assessments as the level of resources that all would be assured. The combination of these features resulted in more help for some districts with greater wealth and thus the reduction of wealth neutrality and equalization began.

The 1978 Changes in General State Aid

The General Assembly changed the way that aid would be distributed by the following adjustments. The add-on for districts under formulas other than the resource equalizer was changed from 25 percent to 50 percent. This was a very important change in the distribution of state money and constituted a political victory for "downstate" school districts in Illinois. The calculation of the formula for calculating compensatory assistance based on Title I students was adjusted by raising the concentration weighting of the resource equalizer for Title I students in a district with the state average to .45 and limiting the maximum to .675. The formula previously presented was changed as follows

(4) (d) . . . ~~.375~~ .45 not to exceed ~~.75~~ .675.

The support level was increased to $46,290 for K-12, $70,430 for K-8, and $124,762 for 9-12 districts. This was first passed at a level that would at maximum tax rates

guarantee $1,293 per TWADA pupil; but, with the above final figures agreed to in late 1978, the level of support possible rose to $1,310 per TWADA pupil.

These changes significantly increased the share of dollars going to nonurban areas, and they also shifted the districts which received dollars to a number of districts that had fairly high or high property wealth.

The amendments in both 1976 and 1978 changed the benefiting districts and shifted significant numbers of dollars toward relatively more property wealthy districts.

APPENDIX B

An interesting situation was found in high school districts in Illinois. Even though 95 percent of students in these districts were funded under the resource equalizer formula, equity attainment was not present even when examining only that 95 percent. The state legislature has set limits on the operating tax rate a district may use for the computation of the allocation formula. In Illinois, that limit is .0105. The problem was that 97 percent of high school districts exceeded that limitation. What then happened was that the state, through the resource equalizer formula, equalized the state allocation according to wealth and effort (up to .0105). Even though the state equalized their revenues, those districts that taxed above the set limit still received local funds and those local funds became a function of the effort above the .0105 level at which the state attempts to equalize. Therefore, the richer district, even though within the confines of the formula according to ASVLTWA, with equal effort drew greater local revenues from their superior wealth. In essence, the equalizing power of the formula had been overridden. A hypothetical example is given below.

The Resource Equalizer Formula was as follows in 1978-79.

$TWADA * OTR * (ASVLTWA_g - ASVLTWA_d)$

Where: $ASVLTWA_g$ = a guaranteed amount of assessed valuation for each district type; in the case of H.S it is $124,762

$ASVLTWA_d$ = actual district assessment per pupil

OTR = operating tax rate of the district up to a maximum of .0105

Note: this does not mean the OTR may not be larger, only that for formula purposes it may not exceed .0105. Notice that .0105 * 124,762 = $1310, the dollar amount that the state guarantees if a district taxes at the maximum allowable level.

EXAMPLE

	District A	District B	
TWADA	200	200	
OTR	.0150	.0150	(both exceed the .0105 "allowed" level)
ASVLTWA	24,762	64,762	

Because both districts' ASVLTWA is below the state guaranteed level, both districts would most likely have chosen to be on the Resource Equalizer Formula.

District A:

State Allocation = $TWADA * OTR * (ASVLTWA_g - ASVLTWA_d)$
$200 * .0105 * (124,762 - 24,762)$
$200 * .0105 * 100,000$

State Allocation = $210,000/TWADA = $1050 (state aid per pupil)

- -

Local Allocation = $OTR * ASVLTWA_d$
$.0150 * 24,762$
= $371.43 per pupil

STATE	$1050
+ LOCAL	371
REVTWADA =	$1421

District B:

State Allocation = TWADA * OTR * ($ASVLTWA_g$ - $ASVLTWA_d$)
200 * .0105 * (124,762 - 64,762)
200 * .0105 * (60,000)

State Allocation = $126,000/TWADA = $630 (state aid per pupil)

- -

Local Levy = OTR * $ASVLTWA_d$
.0150 * 64,762
= $971.43 per pupil

STATE	$ 630
+ LOCAL	971
REVTWADA =	$1601

So we see that under the same formula, with the same OTR, that District A ($1,421) had less revenue per pupil than did District B ($1,601)

APPENDIX C

DISTRICT VS. PUPIL AS UNIT OF ANALYSIS

Traditionally, the unit of analysis in Illinois school finance research has been the district. Using the district as the unit of analysis allows a small district of perhaps 500 students to carry as much weight in the statistical analysis as Chicago's approximately one-half million students. Although there is no wish to lose that small district's voice in a sea of statistics, neither should any researcher wish to pretend that Chicago's students carry the same weight as the small rural community. Using both units of analysis permits a proper perspective to be maintained. It should be noted that this is also the procedure used by Berne and by Carroll.[1]

Table 7 compares the beta weights derived using the district as unit of analysis and the pupil as unit of analysis.

As can be seen, by using the pupil as the unit of analysis, considerably more optimism can be expressed

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[1]Robert Berne and Leanna Stiefel, A Methodological Assessment of Education Equality and Wealth Neutrality Measures, 1978, Education Finance Center, Education Commission of the States, Denver, Colorado; Stephen J. Carroll, The Search for Equity in School Finance: Summary and Conclusions, 1979, Rand Corporation, Santa Monica, California

TABLE 7

COMPARISON OF RELATIONSHIP BETWEEN ASVLTWA AND REVTWADA WHILE CONTROLLING FOR OTR-USING THE PUPIL AS UNIT OF ANALYSIS AS OPPOSED TO DISTRICT AS UNIT OF ANALYSIS--LOG-10 TRANSFORMATIONS

Type of District	Unit	Beta Weights* 1973-74	1976-77	1978-79
ELEMENTARY	District	.65235	.67987	.80140
	Pupil	.58046	.44124	.61647
HIGH SCHOOL	District	.86058	.68197	.74182
	Pupil	.71355	.54877	.58377
UNIT	District	.77533	.37668	.49554
	Pupil	.67283	.26090	.24902

*The beta weights are derived from the two-variable model--OTR and ASVLTWA as independent variables.

regarding the equity status in Illinois. Typically, those districts that have extremely high valuations and extremely high expenditures make up only a small percentage of a state's total pupil population. By using the pupil weighting method, these districts contribute to the statistical analysis equal to their total proportion of the pupil population rather than on a one-to-one basis. Interesting to note is that by using the pupil as unit of analysis, the unit districts show a very small continued movement toward equity in 1978-79 rather than the "erosion" mentioned earlier in the text. Wealth

neutrality for elementary districts is greatly eroded and wealth neutrality for high school districts is slightly eroded. This very possibly is an artifact of the particular methodology as described in Appendix D.

Although the district has traditionally been the unit of analysis in Illinois, a logical extension of that procedure would be to also utilize the pupils as unit in order to secure a total portrayal of equity status.

APPENDIX D

LOG VS. NON-LOG MEASURES

The purpose of the log transformations, as traditionally used in school finance research, has been to minimize the effect of the "outliers," in terms of wealth and expenditures, on the statistical analysis. However, when used in conjunction with the pupil as unit of analysis (also designed to minimize "outliers"), overmanipulation of the data may occur. The use of either concept in isolation appears to be sound. However, when used in combination, the effect may be overcorrective (see Appendix C).

Table 8 presents comparisons of beta weights derived from linear models using data in the original scale units and also in log-10 transformations. When log functions are used, the derived statistic will generally have a smaller value indicating a greater nearness to equity.

Using the pupil as the unit of analysis (no log transformations) yields values very similar to the log analysis (district as unit), as shown in Table 9. While both methods adequately serve their purpose, the researcher should recognize that when used in combination, the methodology does show signs of manipulation of data to the point

TABLE 8

COMPARISON OF RELATIONSHIP
BETWEEN ASVLTWA AND REVTWADA USING
LOG-10 TRANSFORMATIONS AS OPPOSED TO
ORIGINAL DATA--DISTRICT AS UNIT OF ANALYSIS

Type of District	Measure	Beta Weights* 1973-74	1976-77	1978-79
ELEMENTARY	Log	.65235	.67987	.80140
	N-Log	.83511	.92027	.93379
HIGH SCHOOL	Log	.86058	.68197	.74182
	N-Log	.92943	.79281	.84337
UNIT	Log	.77533	.37668	.49554
	N-Log	.84013	.54550	.68266

*The beta weights are derived from the two-variable model--OTR and ASVLTWA as independent variables.

that conclusions reached are somewhat different than those conclusions reached by a number of alternate methodologies.

TABLE 9

COMPARISON OF RELATIONSHIP
BETWEEN ASVLTWA AND REVTWADA USING
ORIGINAL DATA (PUPIL AS UNIT) AS OPPOSED
TO LOG-10 TRANSFORMATIONS (DISTRICT AS UNIT)

Type of District	Measure	Beta Weights* 1973-74	1976-77	1978-79
ELEMENTARY	Log (District)	.65235	.67987	.80140
	N-Log (Pupil)	.68705	.62198	.74940
HIGH SCHOOL	Log (District)	.86058	.68197	.74182
	N-Log (Pupil)	.74832	.61294	.64067
UNIT	Log (District)	.77533	.37668	.49554
	N-Log (Pupil)	.66549	.31422	.39376

*The beta weights are derived from the two-variable model--OTR and ASVLTWA as independent variables.

APPENDIX E

R^2 CHANGE

A procedure previously used by Garms[1] in "conditional" wealth neutrality research has also been examined in the present research. The same two-variable multiple regression model is used except that the focus of attention is shifted to the R^2 values as opposed to the beta weights. By entering OTR (effort) via a stepwise regression analysis as the first independent variable in the model, the R^2 statistic derived denotes the proportion of variability in our criteron variable (expenditures) that can be attributed to the variability found within the independent variable, OTR or effort. In stepping in the variable wealth (ASVLTWA), we then have an R^2 statistic derived which denotes the proportion of variability that can be attributed to OTR and ASVLTWA in combination. By then subtracting the R^2 derived in the first step from that derived in the step where both variables have been entered, an R^2 change notion is initiated which, in essence, denotes the relationship between wealth and

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[1]Walter I. Garms, Measuring the Equity of School Finance Systems, 1978, University of Rochester, Rochester, N.Y. (N.I.E. Grant 400-77-0085).

expenditures once effort has been controlled. Table 10 presents a comparison of the R^2 change statistics and the beta weights.

As is the case with the beta weights, the larger the value of the R^2 change statistic, the greater is the distance from equity. As can be seen from the data, the use of the R^2 change notion as the equity statistic changes very little any conclusions that were drawn using the beta weights. Tables 11 through 13 present essentially the same comparison. Different combinations of data used (log or non-log) and unit of analysis (pupil or district) are reported.

TABLE 10

COMPARISON OF RELATIONSHIP
BETWEEN ASVLTWA AND REVTWADA WHILE
CONTROLLING FOR OTR USING THE R^2 CHANGE
STATISTIC AS OPPOSED TO BETA WEIGHT--LOG-10
TRANSFORMATION: DISTRICT AS UNIT OF ANALYSIS

Type of District	Statistic*	1973-74	1976-77	1978-79
ELEMENTARY	R^2 Change	.40	.44	.59
	Beta	.65235	.67987	.80140
HIGH SCHOOL	R^2 Change	.66	.44	.52
	Beta	.86058	.68197	.74182
UNIT	R^2 Change	.53	.13	.24
	Beta	.77533	.37668	.49554

*The statistics are derived from the two-variable model--
OTR and ASVLTWA are the independent variables.

TABLE 11

COMPARISON OF RELATIONSHIP BETWEEN ASVLTWA AND REVTWADA WHILE CONTROLLING FOR OTR USING THE R^2 CHANGE STATISTIC AS OPPOSED TO BETA WEIGHT--LOG-10 TRANSFORMATION: PUPIL AS UNIT OF ANALYSIS

Type of District	Statistic*	1973-74	1976-77	1978-79
ELEMENTARY	R^2 Change	.34	.19	.38
	Beta	.58046	.44124	.61647
HIGH SCHOOL	R^2 Change	.51	.30	.33
	Beta	.71355	.54877	.58377
UNIT	R^2 Change	.43	.07	.06
	Beta	.67283	.26090	.24902

*The statistics are derived from the two-variable model--OTR and ASVLTWA are the independent variables.

TABLE 12

COMPARISON OF RELATIONSHIP
BETWEEN ASVLTWA AND REVTWADA
WHILE CONTROLLING FOR OTR USING THE
R^2 CHANGE STATISTIC AS OPPOSED TO BETA
WEIGHT--ORIGINAL DATA: DISTRICT AS UNIT OF ANALYSIS

Type of District	Statistic*	1973-74	1976-77	1978-79
ELEMENTARY	R^2 Change	.64	.77	.76
	Beta	.83511	.92027	.93379
HIGH SCHOOL	R^2 Change	.76	.58	.65
	Beta	.92943	.79281	.84337
UNIT	R^2 Change	.61	.27	.44
	Beta	.84013	.54550	.68266

*The statistics are derived from the two-variable model--
OTR and ASVLTWA are the independent variables.

TABLE 13

COMPARISON OF RELATIONSHIP
BETWEEN ASVLTWA AND REVTWADA
WHILE CONTROLLING FOR OTR USING THE
R^2 CHANGE STATISTIC AS OPPOSED TO BETA
WEIGHT--ORIGINAL DATA: PUPIL AS UNIT OF ANALYSIS

Type of District	Statistic*	1973-74	1976-77	1978-79
ELEMENTARY	R^2 Change	.47	.38	.55
	Beta	.68705	.62198	.74940
HIGH SCHOOL	R^2 Change	.55	.36	.39
	Beta	.74832	.61294	.64067
UNIT	R^2 Change	.40	.09	.14
	Beta	.66549	.31422	.39376

*The statistics are derived from the two-variable model--OTR and ASVLTWA are the independent variables.

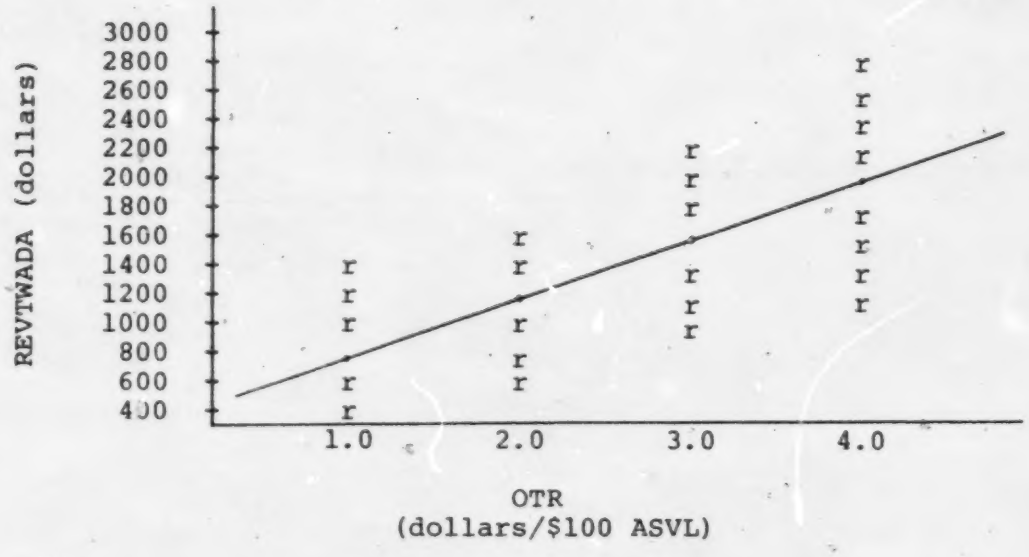
APPENDIX F

RESIDUAL ANALYSIS MODEL

Another methodology examined in the present research was that of the residual R^2 concept. Essentially, in using the multiple regression approach, the researcher is examining the relationship of wealth (ASVLTWA) and expenditures (REVTWADA) while controlling for or holding effort (OTR) constant. The regression model allows the researcher to estimate for all possible operating tax rates a level of expenditure for the districts that hold that OTR. This concept is graphically represented in Figure 1.

The solid line, however, is only an estimated average that is based on the data available and designed to be as accurate as possible given that data. If the estimation formula states that a district with an OTR of 2.0 will have a revenue per pupil of 1,200 dollars, this does not imply that this will be the case for each district holding that tax rate. It might be helpful to think of the estimation as an average value. Some of the districts will fall above the estimated or average level and some will fall below. Since it is known now that all of these districts have an OTR of 2.0, it can be assumed that any differences from the

FIGURE I



estimated point that are observed must be due to other variables, one of which may be the wealth of the district. Classifying observed differences as residuals, another method of equity analysis can be used--the residual analysis model.

Using the estimation formula in the multiple regression model, effort (OTR) has been controlled. Using this control to estimate an average point (expenditures), observed differences from the average point are called residuals. The residual is nothing more than the difference between that which is estimated and that which is observed. In other words, if an estimation is made that a district with a tax rate of X should have revenues per pupil at level Y, it can be assumed that if their observed revenue is, in actuality, Y-r or Y+r,

the difference, or residual, is attributable to something other than OTR. One can then examine the magnitude of the relationship between the residuals and the wealth factor (ASVLTWA), with "conditional" fiscal neutrality being indicated by the absence of any relationship.

Figure 2 presents a scatter diagram of all unit districts. The relationship plotted is the relationship between the residual and the ASVLTWA. On examination, it is clear that those districts that have a negative residual, i.e. a REVTWADA value that is less than would be estimated for a given OTR, tend to cluster toward the lower end of the continuum of ASVLTWA. Plainly, this observed relationship indicates that given the same tax rate, a district that spends less per pupil than the estimated amount will most likely have a lower ASVLTWA than does the district that spends more than estimated. In actuality, the R^2 value of these two variables is .65, a substantial value considering the notion of equity.

Breaking the scattergram down even further provides interesting results. In looking at just those districts using the resource equalizer formula (Figure 3), it is seen that nearly all of them are spending less per pupil than would be expected. Within that grouping, however, there is very little relationship to wealth. So even though those districts are spending less than expected, the formula is providing an approximation of equity. In Figure 4, a

different picture is seen for those districts funded under an alternate method. No equity notion survives here. What a district spends is obviously related to wealth. The greater the residual, the greater the ASVLTWA.

If judgment of equity goals is based only on those districts employing the resource equalizer as their funding formula, all indicators point toward approachment of that goal. However, when the 24 percent of the districts that are not on the resource equalizer are entered in the data, the results become somewhat less conclusive.

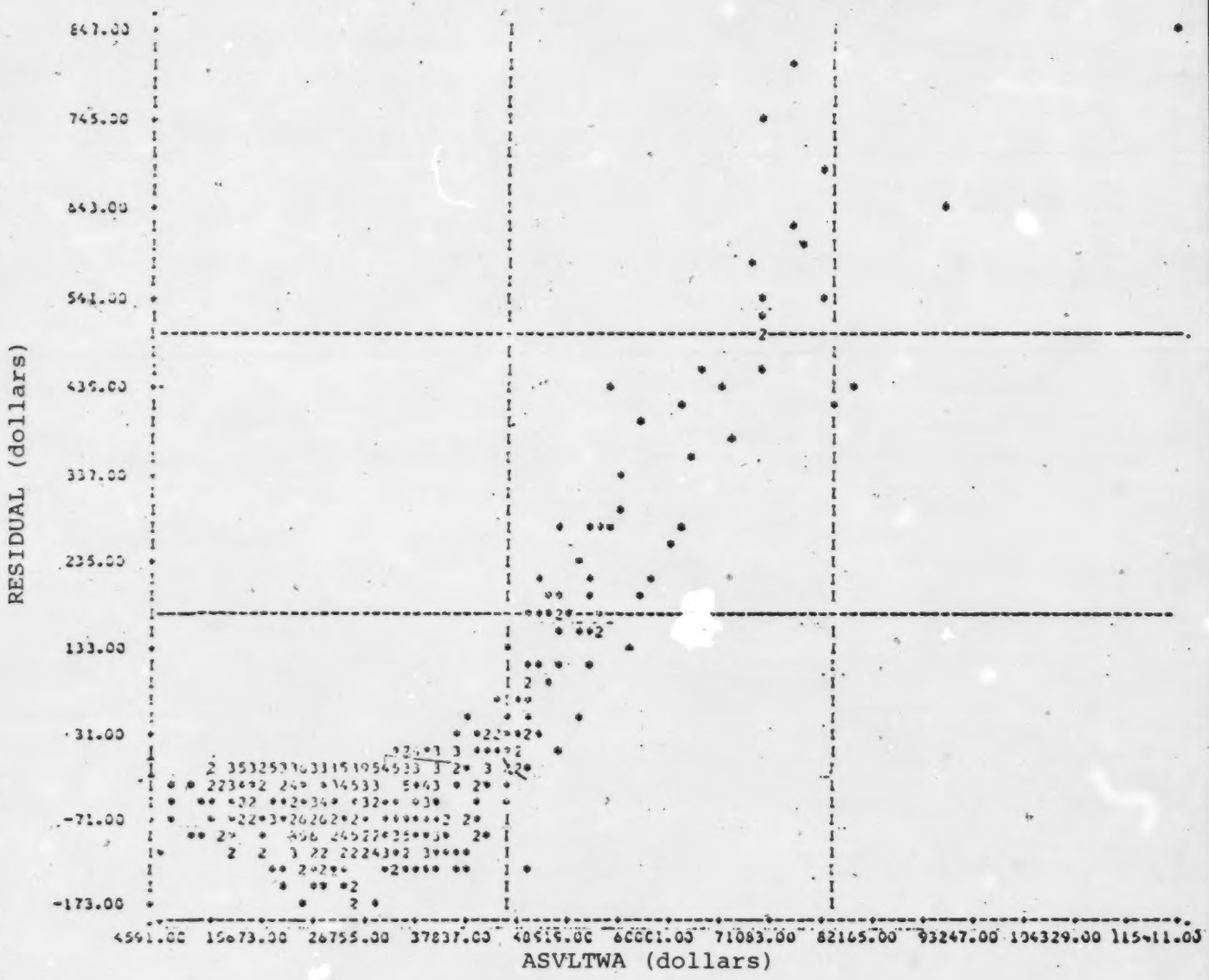


FIGURE 2

SCATTER DIAGRAM OF 1978-79 UNIT DISTRICTS:
ALL DISTRICTS—RESIDUAL AND ASVLTWA COMPARISON

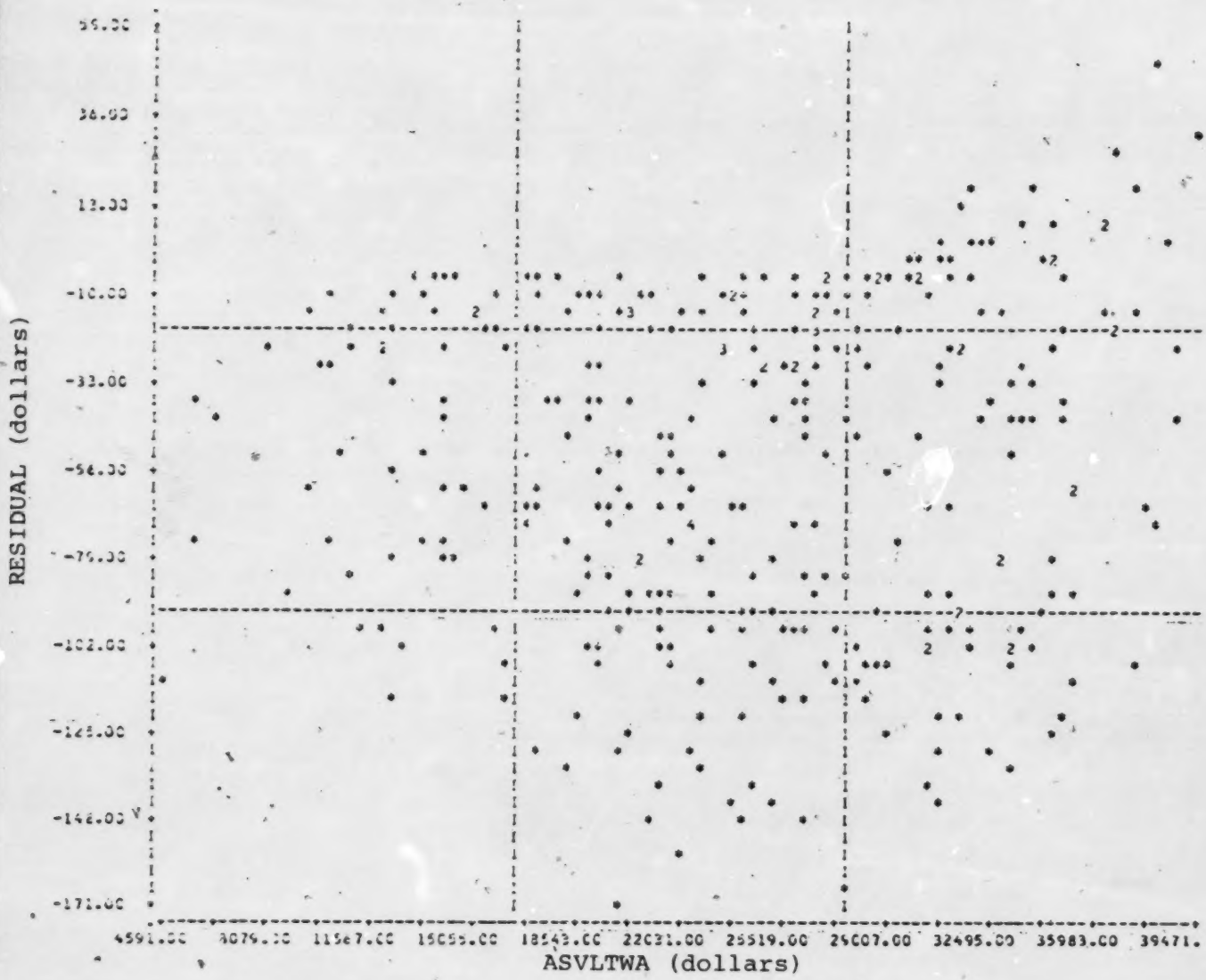


FIGURE 3

SCATTER DIAGRAM OF 1978-79
UNIT DISTRICTS: RESOURCE EQUALIZER
ONLY--RESIDUAL AND ASVLTWA COMPARISON

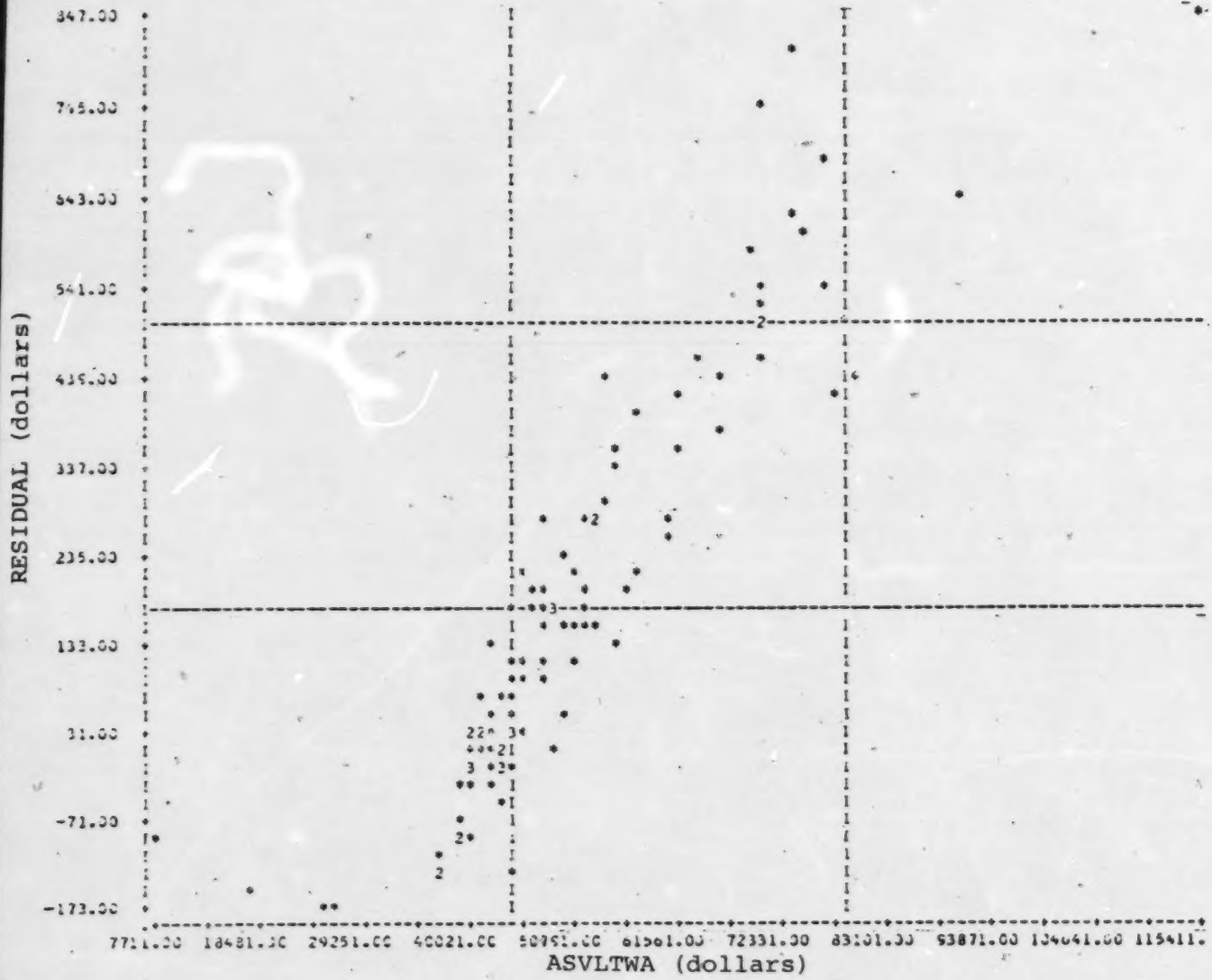


FIGURE 4

SCATTER DIAGRAM OF 1978-79
UNIT DISTRICTS: ALTERNATE METHODS
ONLY--RESIDUAL AND ASVLTWA COMPARISON

The situation differs when examining the results of the residual analysis for high school and elementary districts. In looking at the scattergrams, there is still present a strong linear function as was found in the unit districts (Figures 5 & 6). The difference is in examining only the resource equalizer districts. For high school districts, even when examining only the resource equalizer districts, a strong linear function continues to exist (Figure 7). Although the elementary districts do not demonstrate as strong a function, there is still an existing relationship that is found that does not exist when examining the unit districts (Figure 8).

This phenomenon has been explained in Appendix B as it relates to high school districts and could also be explained in terms of the elementary districts, only to a lesser extent. While the high school districts have 97 percent of the districts outside of the formula parameters in effort (OTR), elementary districts have only 50 percent that are not within the confines. The basic problem is the same--the extent of the problem is different.

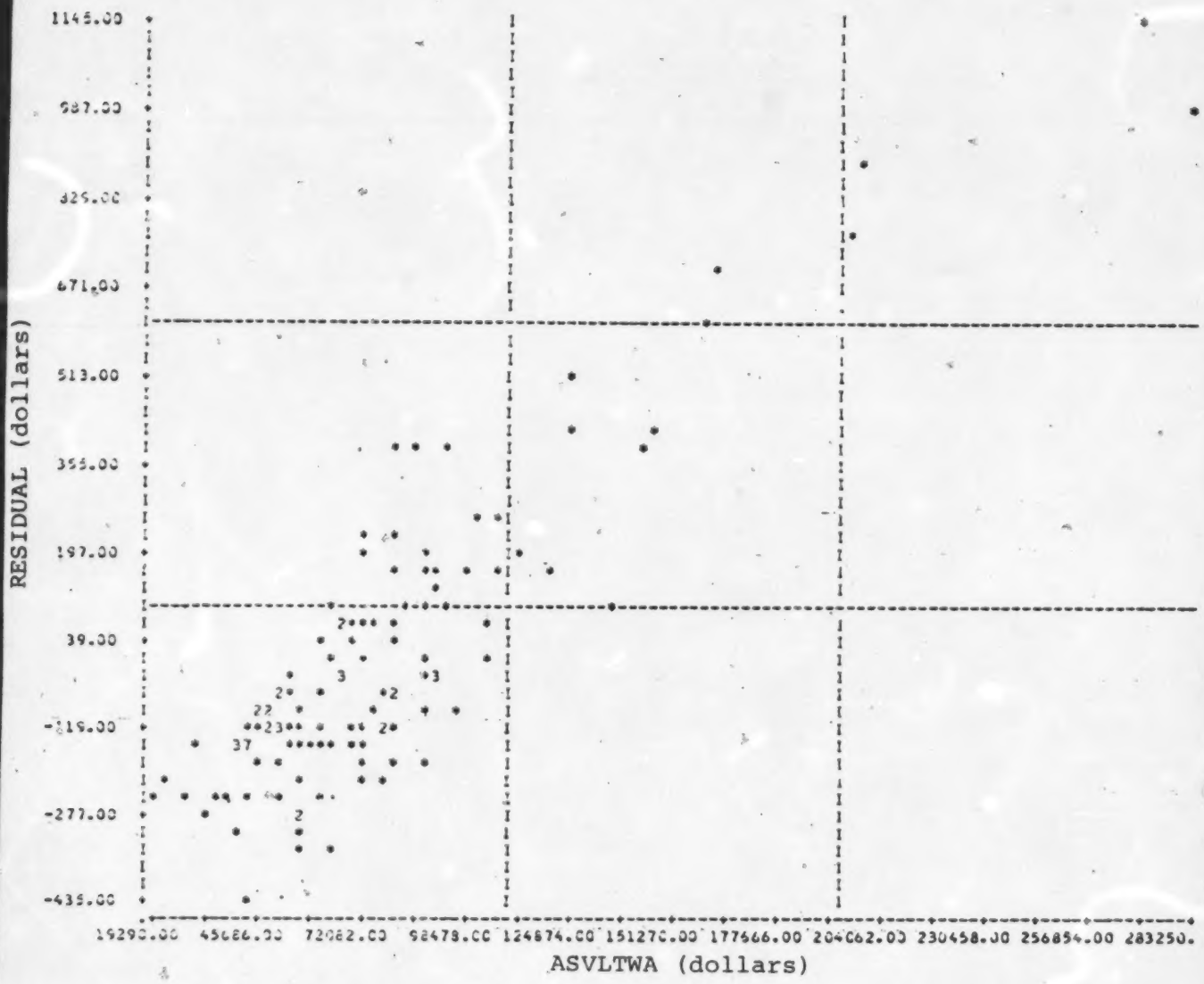


FIGURE 5

SCATTER DIAGRAM OF 1978-79
HIGH SCHOOL DISTRICTS: ALL
DISTRICTS—RESIDUAL AND ASVLTWA COMPARISON

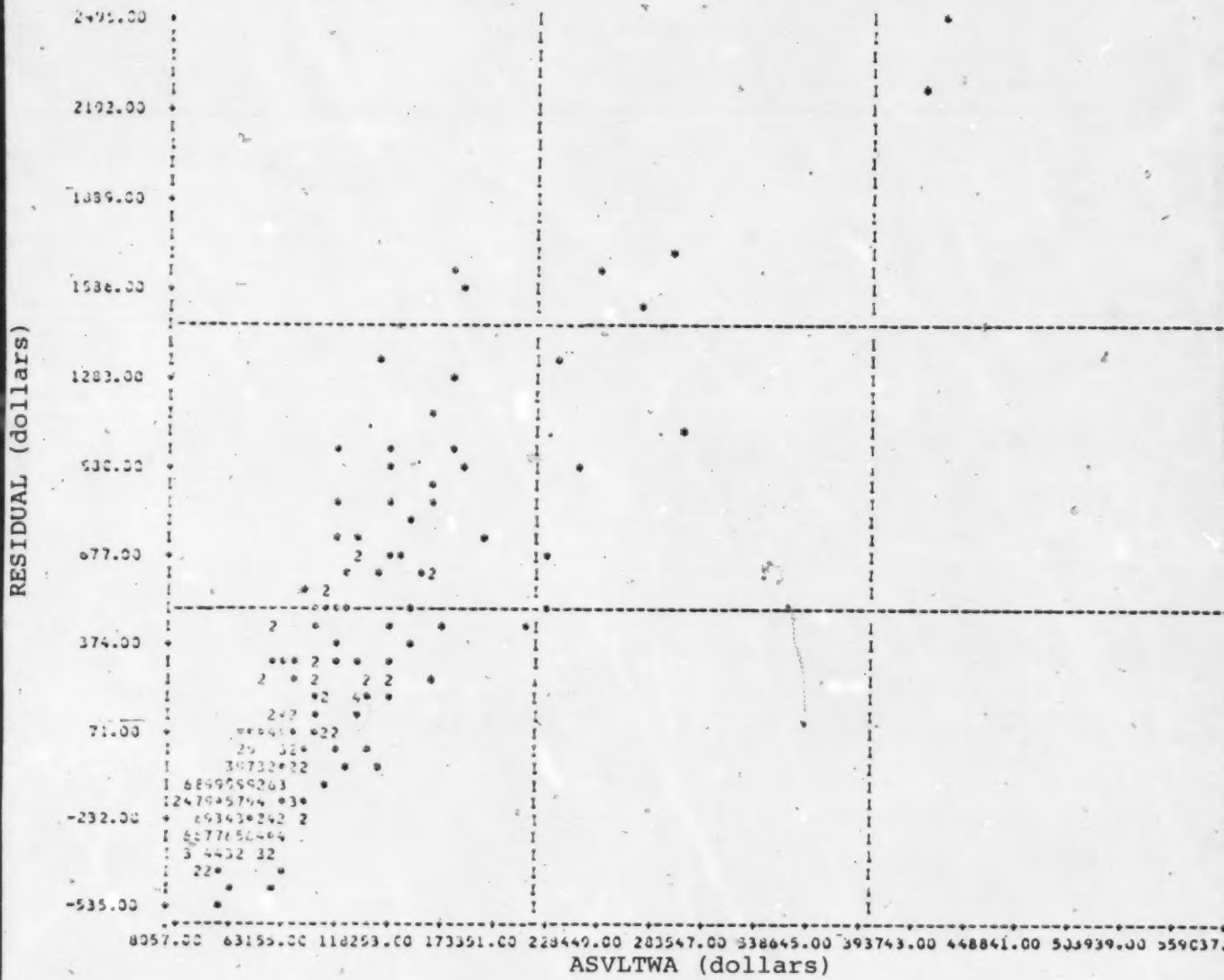


FIGURE 6

SCATTER DIAGRAM OF 1978-79
ELEMENTARY DISTRICTS: ALL
DISTRICTS—RESIDUAL AND ASVLTWA COMPARISON

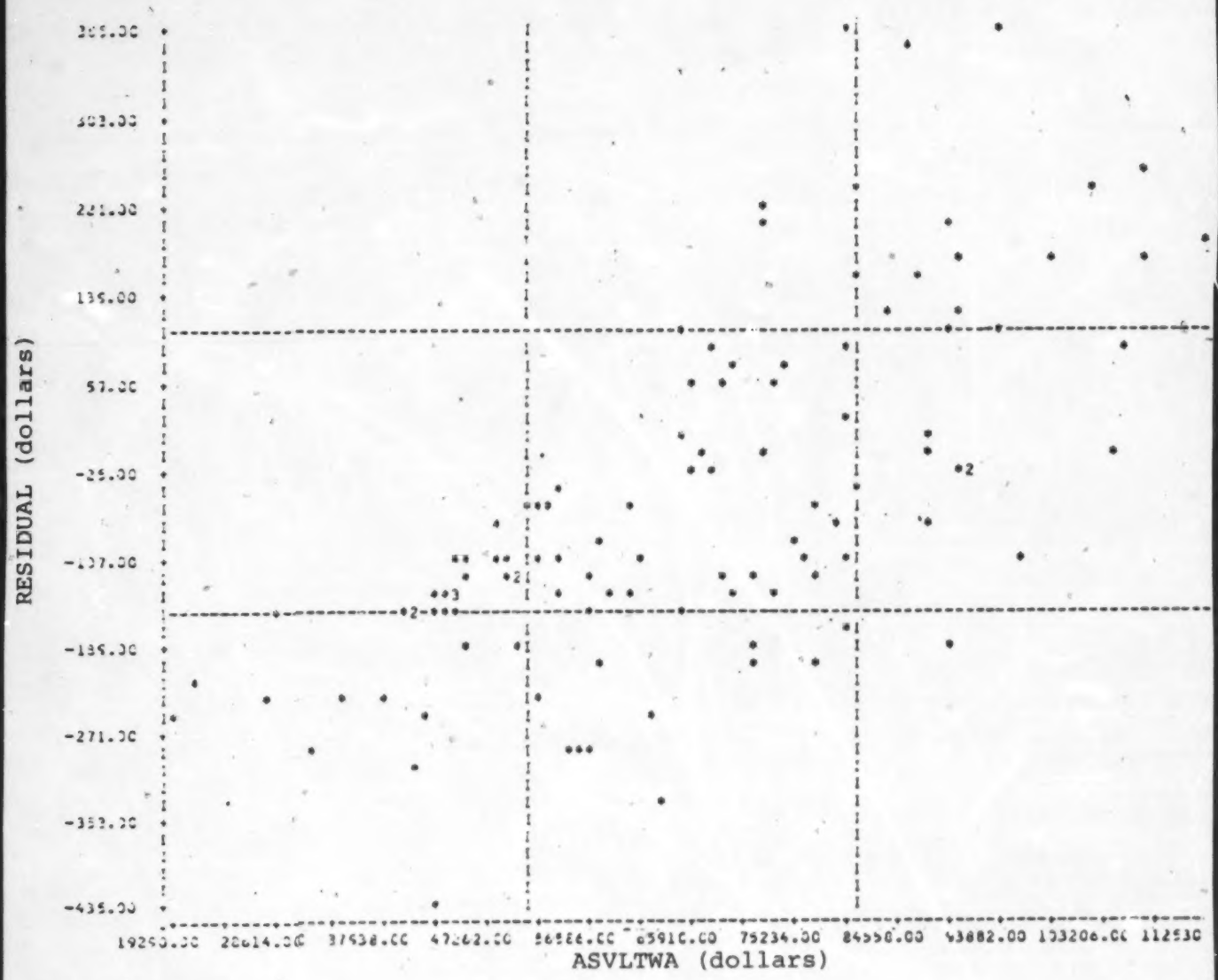


FIGURE 7

SCATTER DIAGRAM OF 1978-79
HIGH SCHOOL DISTRICTS: RESOURCE
EQUALIZER ONLY-RESIDUAL AND ASVLTWA COMPARISON

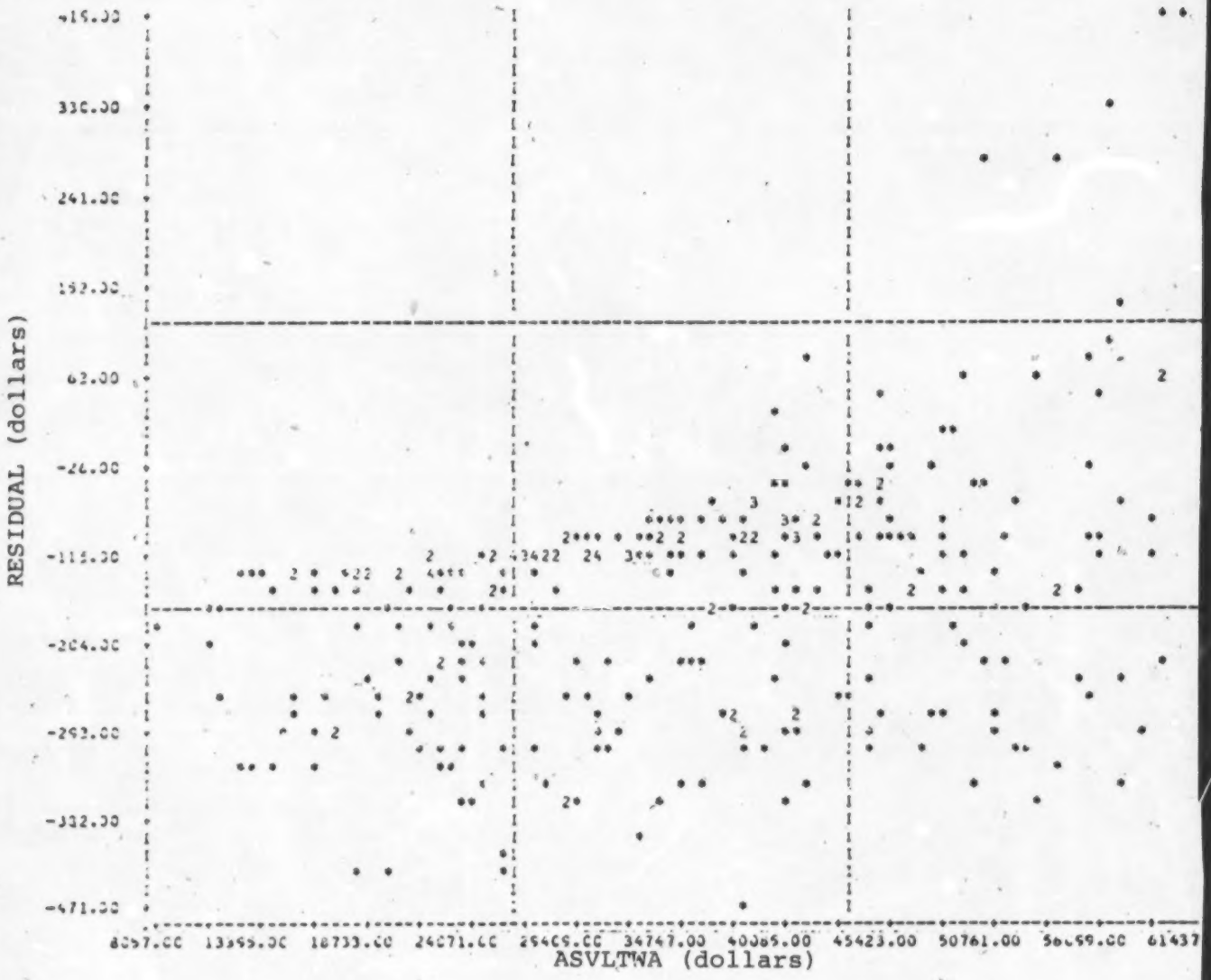


FIGURE 8

SCATTER DIAGRAM OF 1978-79
ELEMENTARY DISTRICTS: RESOURCE
EQUALIZER ONLY--RESIDUAL AND ASVLTWA COMPARISON

Table 14 presents the R^2 values of the relationship between residuals derived and the ASVLTWA of a district.

TABLE 14

RESIDUAL ANALYSIS OF ASVLTWA AND DERIVED RESIDUAL AS DENOTED BY R^2 STATISTIC--ORIGINAL DATA: DISTRICT AS UNIT OF ANALYSIS

Type of District	R^2 Values		
	1973-74	1976-77	1978-79
ELEMENTARY	.68	.77	.72
HIGH SCHOOL	.76	.69	.78
UNIT	.63	.44	.65